

Areas Related to Circles — 2-Page Summary

Sectors, segments and combination figures · Mensuration unit (10 marks)

Key definitions

Sector: the “slice” of a circle enclosed by two radii and the arc between them. The angle between the radii (at the centre) is θ .

Segment: the region between a chord and its arc. Minor segment = sector – triangle formed by the chord and the two radii.

Combination figures: shapes built from circles with triangles, squares or rectangles — solved by adding or subtracting known areas.

Core formulas (radius r , central angle θ in degrees)

Circumference of a circle	$2\pi r$
Area of a circle	πr^2
Length of an arc	$(\theta / 360^\circ) \times 2\pi r$
Area of a sector	$(\theta / 360^\circ) \times \pi r^2$
Area of a minor segment	$(\theta / 360^\circ) \times \pi r^2 - \frac{1}{2} r^2 \sin \theta$
Area of a major segment	$\pi r^2 - \text{area of minor segment}$

Take $\pi = 22/7$ or 3.14 exactly as the question instructs.

Key takeaways

- ✓ The fraction $\theta / 360^\circ$ does all the work — a sector is just that fraction of the full circle, for both arc length and area.
- ✓ Segment = sector – triangle. If you remember only this, you can rebuild the segment formula in the exam.
- ✓ In combination figures, decide first: are you adding regions or subtracting a cut-out? Sketch and shade before computing.
- ✓ Keep units consistent (cm vs m) and write area units as cm^2 or m^2 — unit slips cost easy marks.
- ✓ Leave π symbolic until the last step; substitute $22/7$ or 3.14 only at the end to avoid rounding errors.

Worked example

Question: A sector of a circle of radius 21 cm has a central angle of 60° . Find (i) the length of the arc and (ii) the area of the sector. (Use $\pi = 22/7$)

Step 1 — Write the data. $r = 21$ cm, $\theta = 60^\circ$, so $\theta/360^\circ = 60/360 = 1/6$.

Step 2 — Length of the arc. $\text{Arc} = (\theta/360^\circ) \times 2\pi r = (1/6) \times 2 \times (22/7) \times 21 = (1/6) \times 132 = 22$ cm.

Step 3 — Area of the sector. $\text{Area} = (\theta/360^\circ) \times \pi r^2 = (1/6) \times (22/7) \times 21 \times 21 = (1/6) \times 1386 = 231$ cm².

Step 4 — Check and state units. Arc length in cm, area in cm². Both use the same fraction $1/6$ of the full circle — a quick sanity check.

Exam tip: CBSE awards marks for the formula line, the substitution line and the final answer with units — show all three.

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